

الف) $x^2 - 4x + 1 = 0 \xrightarrow{+1} x^2 - 4x + 4 = 1 \Rightarrow (x-2)^2 = 1 \Rightarrow x-2 = \pm 1 \Rightarrow x = 3, 1$

ب) $x^2 + 11x + 17 = 0 \xrightarrow{+9} x^2 + 11x + 9 = -9 \Rightarrow (x+4)^2 = -9 \Rightarrow x+4 = \pm 3 \Rightarrow x = -1, -7$

الف) $x^2 - 5x + 4 = 0 \Rightarrow (x-2)(x-3) = 0 \Rightarrow \begin{cases} x-2=0 \Rightarrow x=2 \\ x-3=0 \Rightarrow x=3 \end{cases} \Rightarrow x = 2, 3$

ب) $x^2 - 5x - 14 = 0 \Rightarrow (x-7)(x+2) = 0 \Rightarrow \begin{cases} x-7=0 \Rightarrow x=7 \\ x+2=0 \Rightarrow x=-2 \end{cases} \Rightarrow x = 7, -2$

الف) $x^2 - 3x - 5 = 0$
 $a=1 \quad b=-3 \quad c=-5$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{3 \pm \sqrt{29}}{2}$$

$$x = \frac{3 + \sqrt{29}}{2} \quad x = \frac{3 - \sqrt{29}}{2}$$

ب) $2x^2 - 11x + \frac{1}{2} = 0$
 $a=2 \quad b=-11 \quad c=\frac{1}{2}$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{11 \pm \sqrt{117}}{4}$$

$$\sqrt{117} = 3\sqrt{13} \quad \frac{11 \pm 3\sqrt{13}}{4} = \frac{11}{4} \pm \frac{3\sqrt{13}}{4}$$

$$x = \frac{11 + 3\sqrt{13}}{4} = 1 + \frac{\sqrt{13}}{2} \quad x = \frac{11 - 3\sqrt{13}}{4} = 1 - \frac{\sqrt{13}}{2}$$

الف) $x^2 - 3x + 2 = 0$
 $a=1 \quad b=-3 \quad c=2 \quad a+b+c=0 \Rightarrow$
 $a+b+c=1+2+(-3)=0$

$$x_0 = 1$$

$$x = \frac{c}{a} = \frac{2}{1} = 2$$

ب) $4x^2 + x - 3 = 0$
 $a=4 \quad b=1 \quad c=-3 \quad a+c=b \Rightarrow$
 $a+c=4-3=1=b$

$$x = -1$$

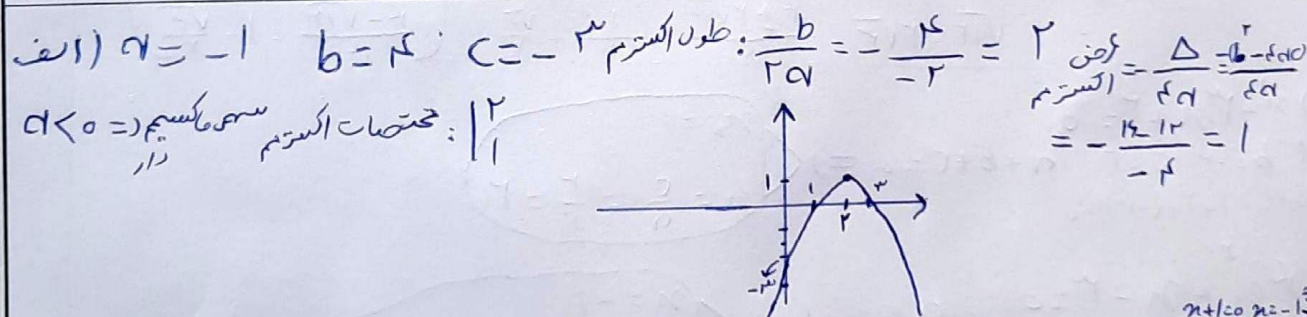
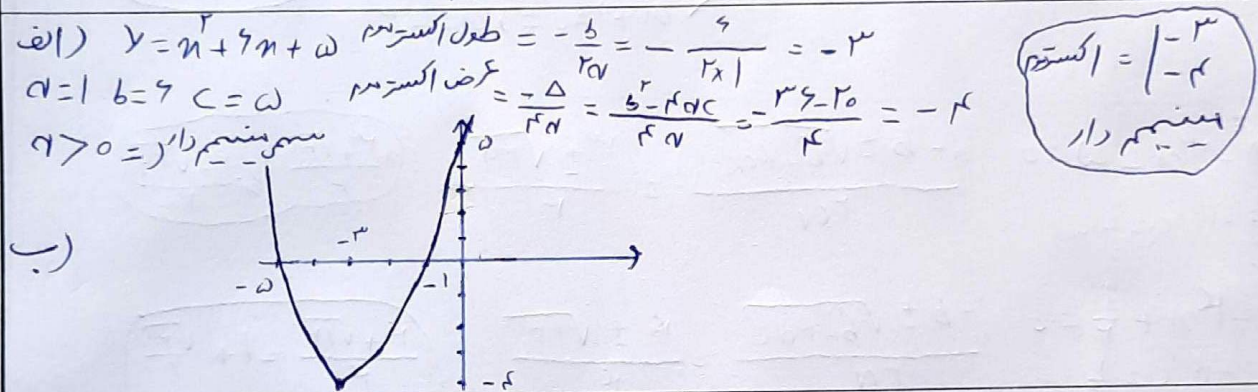
$$x = -\frac{c}{a} = -\frac{-3}{4} = \frac{3}{4}$$

الف) $\omega x^2 - 12x + 17 = 0 \quad x^2 - 12x + 17\omega = 0 \Rightarrow (x-5)(x-\omega) = 0 \Rightarrow \begin{cases} x-5=0 \Rightarrow x=5 \\ x-\omega=0 \Rightarrow x=\omega \end{cases}$
 $\div a(\omega) \Rightarrow x = \frac{17}{\omega}$
 $x = \frac{\omega}{\omega} = 1$

ب) $3x^2 - 10x + 17 = 0 \quad x^2 - 10x + 17 = 0 \Rightarrow (x-3)(x-17) = 0 \Rightarrow \begin{cases} x-3=0 \Rightarrow x=3 \\ x-17=0 \Rightarrow x=17 \end{cases}$
 $\div a(x) \Rightarrow x = \frac{17}{x} \Rightarrow x^2 = 17 \Rightarrow x = \pm \sqrt{17}$

۶) $x^2 + \omega x - 1 = 0$ $\Delta = b^2 - 4ac = \omega^2 - 4(1 \times -1) = \omega^2 + 4 > 0$ $\Rightarrow$ ریشه حقیقی و متمایز دارد
 ب) $x^2 - x + 2 = 0$ $\Delta = b^2 - 4ac = 1 - 4(2 \times 1) = -7 < 0$ $\Rightarrow$ ریشه حقیقی ندارد
 پ) $x^2 - 4x + 2 = 0$ $\Delta = b^2 - 4ac = 16 - 4(2 \times 2) = 0$ $\Rightarrow$ ریشه حقیقی یا ریشه مضاعف دارد
 ت) $x^2 - x + 1 = 0$ $\Delta = b^2 - 4ac = 1 - 4(1 \times 1) = -3 < 0$ $\Rightarrow$ ریشه حقیقی ندارد

۷) الف) $\Delta > 0 \Rightarrow b^2 - 4ac > 0$ $9 - 4(2a) > 0$ $9 - 8a > 0$ $9 > 8a$ $\Rightarrow a < \frac{9}{8}$
 ب) $\Delta = 0 \Rightarrow b^2 - 4ac = 0$ $9 - 4(2a) = 0$ $9 - 8a = 0$ $9 = 8a$ $\Rightarrow a = \frac{9}{8}$
 ج) $\Delta < 0 \Rightarrow b^2 - 4ac < 0$ $9 - 4(2a) < 0$ $9 - 8a < 0$ $9 < 8a$ $\Rightarrow a > \frac{9}{8}$
 د) $\Delta \geq 0 \Rightarrow b^2 - 4ac \geq 0$ $9 - 4(2a) \geq 0$ $9 - 8a \geq 0$ $9 \geq 8a \Rightarrow a \leq \frac{9}{8}$



ج) $n^2 + 4n - 3 = 0 \rightarrow n^2 + 4n + 3 = 0 \Rightarrow (n+1)(n+3) = 0$
 $n+1=0 \Rightarrow n=-1$
 $n+3=0 \Rightarrow n=-3$

۱۰) $S = -\frac{b}{a} = -\frac{-3}{1} = 3$ $P = \frac{c}{a} = \frac{-2}{1} = -2$
 $a = 1$ $b = -3$ $c = -2$
 الف) $S^2 - 2P = 3^2 - 2(-2) = 9 - (-4) = 9 + 4 = 13$
 ب) $S^3 - 3SP = 3^3 - 3(-2 \times 3) = 27 - (-18) = 27 + 18 = 45$